



RESEARCH SEMINAR

When Can Graph Neural Networks Work?



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Abstract

Graph Neural Networks (GNNs) have shown their power in graph representation learning that have advanced various real-world applications in many domains such as biology and healthcare. As a result, a large number of GNNs have been developed in recent years. However, graphs in reality can be very diverse and it lacks understanding of when GNNs can work in practice. In this talk, I first connect numerous GNNs with a graph denoising problem that provides us a new perspective to understand why GNNs can work for graphs with homophily. Meanwhile, we empirically find that GNNs can achieve strong performance on some commonly used heterophilous (or non-homophily) graphs. Then I further discuss homophily is not a necessity for good GNN performance and correspondingly introduce a more general assumption about when GNNs can work with supporting theoretical understanding and empirical observations.

About the Speaker

Prof. Jiliang TANG is University Foundation Professor in the computer science and engineering department at Michigan State University. He got one early promotion to Associate Professor in 2021 and then a sharp promotion to Full Professor at 2022. Before that, he was a research scientist in Yahoo Research. He got his Ph.D. from Arizona State University in 2015 and MS and BE from Beijing Institute of Technology in 2010 and 2008, respectively. His research interests include graph machine learning, trustworthy AI, and their applications in Education and Biology. He authored the first comprehensive book “deep learning on graphs” with Cambridge University Press and developed various well-received open-sourced tools including scikit-feature for feature selection, DeepRobust for trustworthy AI and DANCE for single-cell analysis. He was the recipient of various prestigious awards (2022 AI’s 10 to watch, 2022 IAPR J. K. AGGARWAL, 2022 SIAM SDM, 2021 IEEE ICDM, 2021 IEEE Big Data Security, 2020 ACM SIGKDD, 2019 NSF), numerous industrial faculty awards (Amazon, Cisco, Johnson&Johnson, Criteo Labs and SNAP), and 8 best paper awards (or runner-ups) including WSDM2018 and KDD2016. He serves as conference organizers (e.g., KDD, SIGIR, WSDM and SDM) and journal editors (e.g., TKDD, TKDE and TOIS). He has published his research in highly ranked journals and top conference proceedings, which have 27,000 citations with h-index 80 and extensive media coverage.